



Objectives for Human Missions to NEOs

Policy and Public Engagement

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Magnitude of Findings



Theme	Number of Objectives
Demonstrate Deep Space Capabilities	25
Scientific Research	19
Planetary Defense	13
Economic Expansion	5

- Multiple approaches for human NEO missions
- Thoughtful approach to human NEO missions needed to ensure the maximum return on investment

Deep Space Capabilities Theme: Key Observations



- **Objectives**

- The mission should contribute to planetary defense and economic expansion
- Demonstrate the ability for extended operations in deep space
 - Hardware, software reliability and repair
- Build in the ability to respond in real-time to new information
- Develop dust mitigation techniques

- **Activities**

- Ensure open communication between the crew and the people
- Develop robotic installation techniques
- Develop adequate radiation shielding, mitigate reactive chemistry

Scientific Research Theme: Key Observations



- **Objectives**

- Characterize resource rich targets, structural stability and chemistry
- Identify human factors, risks of extended missions
- Learn more about the beginning of the solar system

- **Activities**

- Safely remove a core drill sample at multiple depths
- Leave a scientific network for tracking and seismic monitoring
- Take multiple samples across a NEO population

- **Target Characteristics**

- Would robotic precursor missions synchronize with human missions?

Planetary Defense Theme: Key Observations



- **Objectives**

- Planetary defense (protection) plus economic drivers (economic growth) should be the level 1 objective
- Be able to answer all questions that would enable you to more accurately characterize the NEO and its orbital location in order to support mitigation decisions about similar bodies

- **Activities**

- Test deflection techniques
- Develop an international working group on threat mitigation
- Safely remove a core drill sample
- Leave a scientific network
- Take multiple samples across a NEO population

- **Target Characteristics**

- Accessibility
- Representative of population of interest and scientifically interesting?
Commercially useful? Potentially hazardous?

Economic Expansion/ISRU



- **Objective**
 - Identify valuable materials
- **Activities**
 - Develop means for gathering resources from NEOs
 - Develop a NEO resource map
 - Grapple and bring a portion of an asteroid near the Earth/moon